$3750 (800-line quality storage tube)

Uses storage tube, reads out TV (thousand-line)

PEP 400 STORAGE TERMINAL

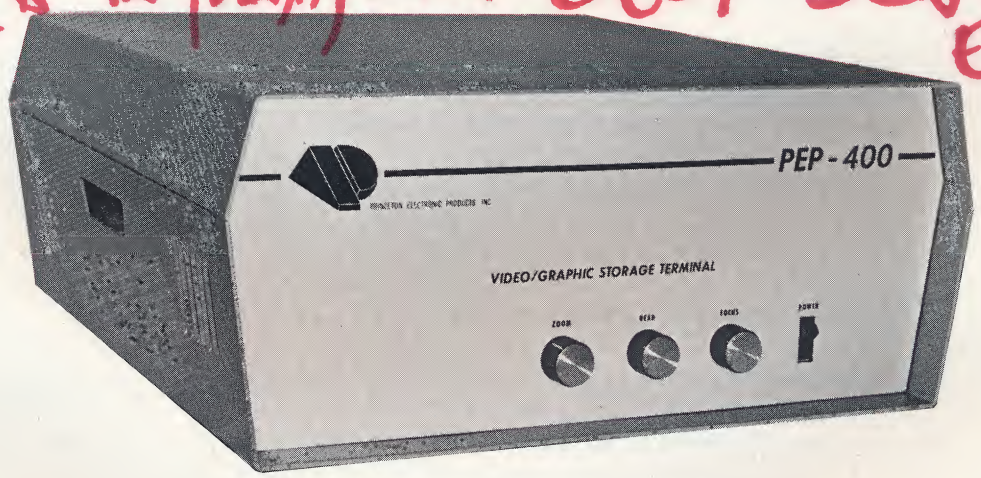
SELECTIVE ERASE

NEW MULTIPURPOSE STORAGE TERMINAL STORES BOTH HIGH RESOLUTION GRAPHICS AND FULL GRAY SCALE VIDEO IMAGES.

★ HALF HOUR STORAGE

★ ZOOM (electronic)

★ under 2¢ in quantity. ★ GREY-SCALE EXCELLENT



PRINCETON ELECTRONIC PRODUCTS, INC. P. O. BOX 101, NORTH BRUNSWICK, N. J. 08902

FEATURES:

High Resolutions (800-1200 Horizontal Lines)

Six Logarithmic Shades of Gray

High Speed Magnetic Deflection-6μsec for full screen deflection to within one beam spot.

30 MHz Video Write and Read Bandwidth

525 or 1029 Line Video Readout Option

Multiple Display Monitor Capability

APPLICATIONS:

Scan Conversion

Patient Monitoring Systems

Facsimile

Interactive Graphic Displays

Alphanumeric Terminals

Projection Displays

Education Consoles

Microfiche/Microfilm Retrieval

Commercial TV Systems

X-Ray Fluoroscope Storage

High Speed Storage Oscilloscopes

Signal Analyzers

Air Traffic Consoles

INTRODUCTION

The PEP 400 storage terminal is a new multipurpose electrical in-electrical out storage terminal utilizing Princeton Electronic Products Inc. revolutionary LITHOCON™ silicon storage tube. It offers a number of significant advantages in performance and cost over presently existing equipment, both due to its multiplicity of uses and to the technological improvements in image storage made possible by the LITHOCON™ tube. The advantages include the capabilities for:

1. Full Gray Scale Video Image Storage

   The LITHOCON™ tube's high writing speed makes possible high resolution video frame storage systems with a minimum of six logarithmic shades of gray and limiting resolutions of 800-1200 lines.

2. Storage of High Resolution X-Y Generated Images

   The terminal in this application functions as a scan converter storing information written in x-y random fashion and reading out in raster scan for display on any CRT monitor. The high writing and selective erase speed of the LITHOCON™ tube, combined with a high speed deflection amplifier/yoke design, make the PEP 400 uniquely suited for graphics applications.

BASIC OPERATION

The PEP 400 can be effectively utilized in a large number of applications. To briefly describe the functions of the terminal, we have summarized below three major uses, namely, (1) X-Y Generated Images; (2) Video Frame Storage; and (3) Video Scan Conversion.

1. X-Y Generated Image Storage

   The PEP 400 is designed to function as the storage and refresh memory portion of a computer graphics terminal, interfacing with the logic control and the D-A converter output of the terminal. The unit accepts the following inputs:

   a) X axis deflection
   b) Y axis deflection
   c) Cathode Blanking
   d) Write Gate
   e) Selective Erase Gate
   f) Clear

It provides the following outputs:

a) Video (75Ω) for driving a CRT Monitor
b) Composite Sync for driving a CRT Monitor
c) Vertical blanking

Due to the high writing speed of the LITHOCON tube, and the high speed x-y deflection amplifiers, the 400 can be cycled rapidly, allowing it to record and display a flicker free, continuously growing trace. This is done by means of generating and drawing new vectors and characters during the vertical blanking of the CRT. The vertical blanking pulse is available from the PEP 400 to gate on the vector generator. Therefore, the terminal remains in the read mode, except during vertical blanking. During this period, depending upon the input command (write or erase), the tube's mode, as well as the beam position and blanking are controlled by the vector generator, allowing for the drawing of new information.

In Figure 1 below, a block diagram of the system logic required is shown:

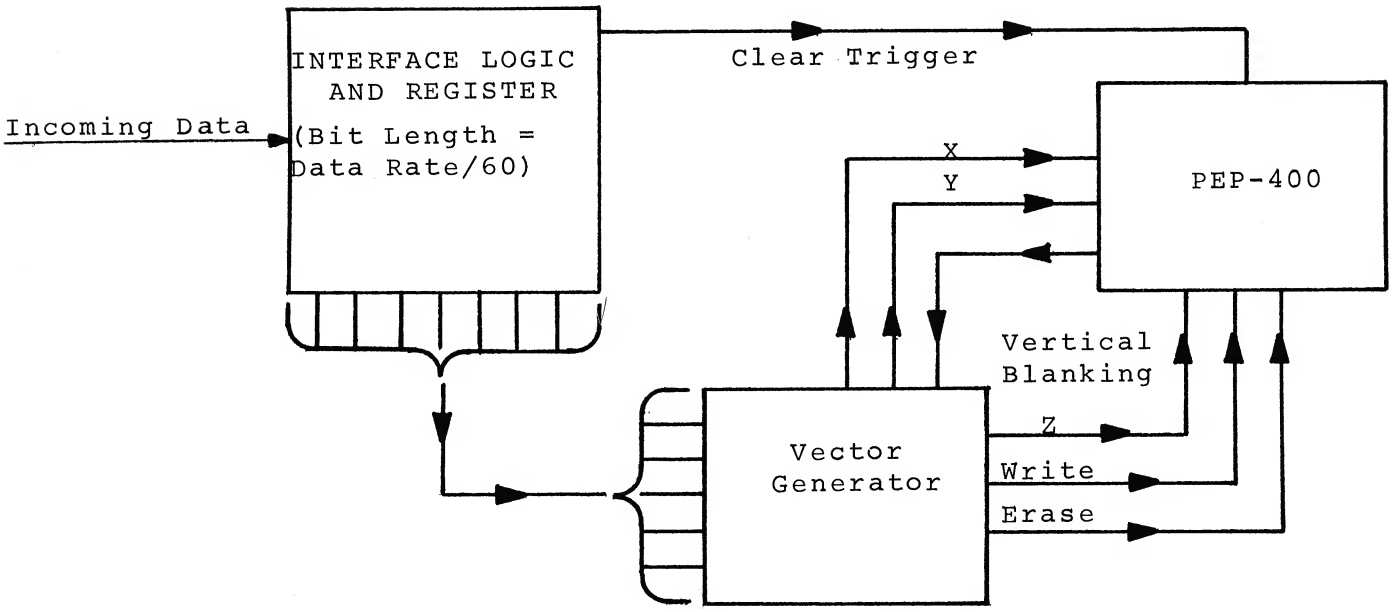


FIGURE 1

The Clear Trigger is a command to erase the entire screen in a raster scan for a determined period of time, which can be varied from 100 msec to 1 second.

The approach discussed is practical for most input data rates. To show this, consider a system with a 2400 baud/sec rate. In this case, 40 bits are transmitted during a field (1/60 sec). For a 1024 line system, this represents two vectors.

The 1 msec time period allowed for drawing these vectors is more than sufficient for the LITHOCON™ tube which has a typical dot writing speed of less than 20 nsec. Drawing speed will therefore be limited, not by the tube or the deflection amplifiers, but by the vector generator. For a 9600 baud/sec rate, up to 8 vectors per field are transmitted. Therefore, these eight vectors must be drawn during the 1 msec vertical blanking time, roughly 100 μsec/vector, well within the capability of the PEP 400.

2. Video Frame Storage

The PEP 400 interacts directly with a video channel in order to store video information. A typical example is the capture or "frame snatch" of a video frame directly from a camera or a video linkup. The terminal is capable of being hooked up to either 525 or 1029 line video systems, and can operate in several modes: (a) as an independent unit with its own logic, timing and sync circuits; (b) as a complete "slave" terminal to which write and erase commands, as well as external sync are provided, and (c) a combination of both, in which the unit is controlled externally only during write and erase while having its own sync and timing during read.

A block diagram of a system utilizing the PEP 400 for video frame storage is shown in Figure 2. As shown, the PEP 400 is operating under command of the camera during the write period.

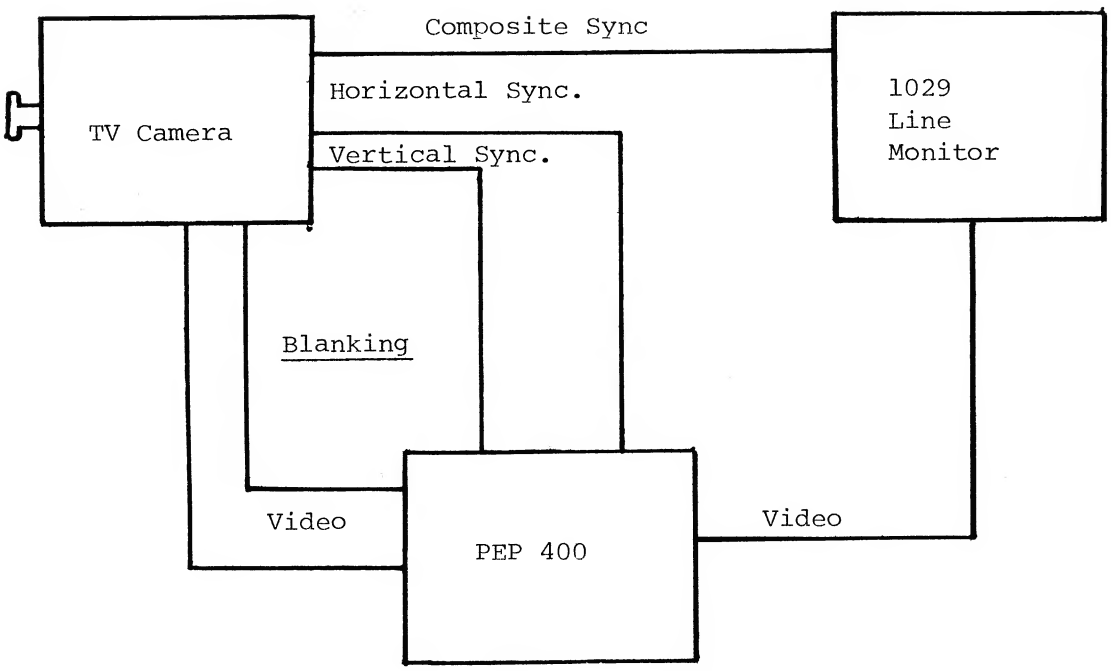


FIGURE 2

3. Video Scan Conversion

The unit can also be utilized as a scan converter. In this mode, the input may be written in either video format or x-y (such as from a computer terminal or low frequency transmission system) and readout via external scan inputs which are provided. The enabling of the external scan is via an external read gate logic input (0 to -4 volts).

Examples of application in which this mode is useful include:

a) Facsimile transmission in which the PEP 400 may be used either to down convert full gray scale video for low frequency transmission, or to up convert low frequency transmission data for display on a CRT.
b) Computer hard copy printout on raster scan printers.

SPECIFICATIONS

TUBE 1M-800-HS or 1M-1200-HS LITHOCON STORAGE TUBE

1.	Resolution	800 or 1200 TV lines
2.	Retention Time*	>12 minutes (active readout)
3.	Spot Writing Time	<20 nsec.
4.	Full Target Erase Time*	150-500 msec.
5.	Magnetic Deflection and Focus	

* Erase Time and Retention Time are related. Erase speed can be shortened with a corresponding proportional decrease in the other.

INPUT

1. Deflection

   a) X and Y input
   b) Amplitude $\pm$ .3v for full screen deflection
   c) Input impedance: 3000Ω
   d) Bandwidth: DC- 3MHz
   e) Slew Rate: 0.3 in./μsec (0.5 inch is full target deflection)
   f) Beam Settling Time: 6μsec for full screen deflection to one beam diameter from final position

2. Video Write

a)	Amplitude	1 volt peak-peak
b)	Imput Impedance	50Ω
c)	Bandwidth	10 MHz/30MHz

3.	External Blanking	0 to -4 volts
4.	Write Gate	0 to -4 volts
5.	Clear Trigger	Generates Full Screen Erase
6.	Selective Erase Gate	0 to -4 volts
7.	External Read Gate	0 to -4 volts

Output

1. Video

a)	Bandwidth	10 MHz/30 MHz
b)	Sensitivity	1 volt per 100 na of target current.

2. Synchronization

525/1029 line composite 2 : 1 interlaced sync signals meeting EIA standards. Output drives 75Ω; typical for any monitor.

3. Vertical Blanking Gate 0 to -4 volts

Other input and output terminals can be provided to meet special options or functions desired. These include vertical and horizontal drive for sharing a camera, as well as inputs to accept external sync.

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